Glenn Research Center Environmental Programs Manual

Chapter 6 – Pollution Prevention and Greening the Government Plan

NOTE: The current version of this Chapter is maintained and approved by the Environmental Management Office (EMO). The revision date for this chapter is May 2002. If you are referencing paper copies, please verify that it is the most current version before use. The current version is maintained on the Glenn Research Center intranet at http://osat-ext.grc.nasa.gov/emo/pub/epm/epm-contents.pdf. Approved by: EMO Chief, Michael Blotzer {mailto: Michael.J.Blotzer@grc.nasa.gov}.

PURPOSE

This chapter represents the NASA Glenn Research Center (GRC) Pollution Prevention (P2) and Greening the Government (GTG) Plan for the year 2002. The P2 plan conforms to the requirements of GRC Environmental Management System (EMS) specified in NPG 8553, NASA Environmental Management System Procedures Manual and ISO 14001 as shown in Chapter 1 of this manual. This chapter also satisfies the waste minimization requirements of Resource Conservation Recovery Act (RCRA) for the GRC.

This plan establishes policies and procedures for applying pollution prevention principles to facility operation and practicing greening the government strategies with regards to purchasing decisions and GRC policies. The GRC priorities, consistent with GTG strategies, are source reduction, recycling, treatment, and disposal as necessary. This plan does the following:

- Establishes P2 and GTG goals and requirements, including hazardous waste minimization goals, for GRC during the year 2002
- Promotes waste minimization, P2 and GTG activities throughout the facility by all employees and contractors
- Delineates the roles and responsibilities of individuals, teams and organizations necessary to implement this plan
- Specifies GRC's baseline waste generation, material usage and environmental impact data needed to identify activities with the greatest opportunities for waste reduction and reference for P2/GTG progress.
- Describes waste minimization, P2 and GTG activities and opportunities for the year 2002
- Establishes program metrics and evaluation procedures which relate the results of activities to the goals
- Supports EMS goals including resource allocation for cost effectiveness

APPLICABILITY

This chapter applies to all personnel at the GRC including civil servants, contractor employees, and visitors at the GRC.

DEFINITIONS

Pollution Prevention (P2)
Any practice that reduces the amount of hazardous substance, pollutant, or contaminant entering the waste stream or otherwise released to the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and reduces the hazards to public health and the environment associated with the release of such substances.

Greening the Government (GTG)
The policy defined by several Executive Orders (EO) (13148, 13149, 13150, etc.) that requires federal facilities to go beyond the traditional P2 efforts. This strategy promotes energy and materials conservation and programs to minimize environmental impacts of federal facilities as well as traditional P2 activities. The GTG EO's also require annual reports, which overlap substantially with the scope of P2 reports.

Pollution Prevention Opportunity Assessment (PPOA)
A systematic evaluation of processes and operations to:

- Characterize all aspects of the process or operation, including process flow, waste generation patterns, material and power consumption, costs, manpower, toxic chemicals;
- Define the impacts that the process and related wastes have on the air, water, and land;
- Associate impacts and wastes with specific unit operations; and
- Assign related costs and liabilities with specific wastes and management practices.
- Identify more environment-friendly alternatives.

Release
Any planned or unplanned release of toxic chemicals to the environment including air emissions, off-site transfers of chemicals, waste water discharges, underground injections of waste, and wastes disposed of in on-site landfills. Examples include shipments of hazardous wastes to treatment, storage, and disposal (TSD) facilities.

TRI Chemical
A toxic release chemical or chemical category listed in 40 CFR 372.65 as amended. Users of any of these chemicals are subject to toxic release inventory reporting requirements

NASA Environmental Tracking System (NETS)
The NASA-wide NETS is utilized to track an extensive range of environmental data from all NASA facilities, including numerous P2 and GTG metrics.

BACKGROUND

This P2 and GTG Plan has been designed to be consistent with the goals and requirements of laws and regulations (federal, state and local), of EO's of NASA mission and policies, and of the GRC goals and policies.

A very important element in the P2 program is the Pollution Prevention Opportunity Assessment (PPOA). A PPOA is a project-specific systematic evaluation of a process or operation to characterize all aspects of the process or operation, define the environmental impacts of the process, associate impacts and wastes with specific unit operations, and assign related costs and liabilities to specific wastes and management practices. Alternative products, processes and operations that reduce environmental impacts, plus health and safety hazards are identified. Vendor information is included to facilitate rapid implementation of the PPOA. Considerations used to rank PPOA's for possible implementation include environmental compliance, facility mission impact, environmental benefits, ease of implementation and cost savings.

POLICY

GRC is committed to environmental protection consistent with environmental laws and regulations, Presidential EO's, the Federal Policy on "Greening the Government", NASA's *Environmental Excellence For the Twenty-First Century*, other NASA policies and the GRC environmental policies and programs.

GRC has adopted an Environmental Policy as part of the recently adopted EMS, which states:

"GRC operates in a manner that preserves and protects the environment through pollution prevention, the continual improvement of our operations, and complying with regulations".

The GRC Environmental Programs Manual further delineates this policy and all related implementation strategies. Successful implementation of this pollution prevention plan is a high priority goal for GRC.

The GRC Environmental Award Program to encourages all GRC employees to contribute to the pollution prevention and environmental protection effort. Individuals and teams are encouraged to submit ideas and actively participate in the implementation of selected pollution prevention and resource conservation projects. All entrants will receive recognition while more substantial awards will be given to individuals or teams that submit and/or implement winning ideas that contribute to the pollution prevention effort and/or best reduce GRC's impacts on the environment. A Suggestions and Ideas Status Log will be maintained as a record tracking the current status of each potential project or activity.

NASA Procedures and Guidelines (NPG) documents that pertain to this P2 and GTG plan include NPG 8820.3 (Pollution Prevention) and NPG 8830.1 (Affirmative Procurement Plan for Environmentally Preferable Products). This plan will be revised annually or more often to address new requirements promulgated by regulatory agencies or established by NASA Headquarters and GRC.

The initial baseline for the evaluation of pollution prevention activities was established to be 1994, thus the status analysis (see Appendix 6 – A) relates to that baseline. However, the reference baseline may shift for certain goals as specified by law, regulation, EO and/or policy. EO 13148 establishes new goals that seem to imply the use of year 2000 data as the baseline. The appropriate baseline reference data will be used to analyze progress towards each goal and/or waste type target. These accepted baselines will be fully delineated in the P2/GTG Metrics System document.

NASA GRC policy dictates that annual environmental objectives and targets will be established by the EPCB as part of the EMS operation. The EMS P2 projected outcomes for GRC during the year 2002 include:

- Identify at least 10 pollution prevention activities
- Implement at least 5 pollution prevention activities
- Identify at least 3 solid waste reduction, reuse or recycling opportunities
- Implement at least 1 solid waste reduction, reuse or recycling opportunities
- Identify at least 1 activity for reducing construction solid waste

The P2, solid waste resource conservation and construction waste reduction opportunities that have been identified for NASA GRC for the year 2001 are summarized in P2 Projects Status Log updated monthly. These listed opportunities include those goals and targets required by statutes, EO's and/or policies that apply to NASA GRC.

Annual Pollution Prevention and Greening the Government Opportunities at GRC will be defined and maintained as a record. This list includes at least 10 possible activities that might contribute towards the EMS annual P2 targets, at least 3 possible solid waste resource conservation measures and at least 1 construction waste reduction alternatives. All of these will be included in the Suggestions and Ideas Status Log.

In addition to establishing and maintaining a current status log of projects, a P2/GTG Metrics System record will be maintained to specify metrics and measurement techniques for P2 and GTG activities. An appropriate set of metrics will be applied to each activity, and will be noted in each PPOA. Some activities will require official approval of a document to indicate completion, while other activities will be measured based upon the number of units reduced, recycled and/or removed from the disposal stream. These project-specific metrics may be expanded or modified by the P2 Team to best address each project, and further adjustments may be made during implementation by the project P2 Implementation Team.

The P2 Team will review P2 activities, as well as any additional ideas solicited from all NASA personnel.

REQUIREMENTS

The Pollution Prevention Act of 1990 established pollution prevention strategies as the national environmental policy in the US. Other federal environmental statutes also contain pollution prevention requirements, including the Clean Water Act, the Clean air Act, The Resource Conservation and Recovery Act, and the Emergency Planning and Community Right-to-Know Act. The Ohio House Bill 592 established some pollution prevention rules in Ohio regarding the management of solid wastes.

Several of the Presidential EO's place additional P2 and GTG requirements upon NASA GRC and other Federal facilities.

Some of these EO's supersede previous orders. These include:

- EO 12843 which creates procurement limitations on ozone-depleting chemicals
- EO 12844 which promotes the procurement of alternative-fueled vehicles
- EO 12845 which requires the purchase of energy efficient computer equipment
- EO 12856 which requires the preparation of a written pollution prevention plan and the development of goals to reduce their use and releases of toxic chemicals

- EO 12898 which directs agencies to integrate environmental justice (EJ) into their missions
- EO 12902 which promotes water conservation and energy efficiency
- EO 13101 which requires waste prevention and recycling activities be incorporated into facility operations, and encourages the expansion of markets for recovered materials by establishing a preference for recycled products by federal facilities
- EO 13123 which establishes goals for energy efficiency and greenhouse gas reduction, directs energy consumption reduction measures, promotes renewable energy projects, and requires reductions in the use of petroleum products and water consumption
- EO 13148 which establishes P2 policies and environmental compliance audit programs, promotes management practices, and sets reduction targets and goals for persistent, bioaccumulative and toxic (PBT) chemicals, Toxic Release Inventory (TRI) releases and ozone-depleting substances
- EO 13149 sets goals for the reduction of petroleum consumption by motor vehicle fleets
- EO 13150 establishes a mass transportation and vanpool transportation fringe benefit program for qualified federal employees

Guidance documents have been provided in responses to the above requirements. These NASA guidance documents provide a more detailed description of the requirements for GRC:

- NASA Procedures and Guidelines NPG 8820.3, "Pollution Prevention", March 1, 1999 to March 1, 2004
- NASA Procedures and Guidelines NPG 8830.1, "Affirmative Procurement Plan for Environmentally Preferable Products", February 1 1999 to February 1, 2004

This plan shows how GRC builds a comprehensive program to prevent pollution, reduce waste, conserve energy, and preserve natural resources to satisfy RCRA hazardous waste minimization requirements, as well as the P2/GTG requirements.

Source Reduction

GRC will eliminate or reduce pollution at source through process changes, reengineering and/or material substitution. Specific source reduction elements will include consideration of the following:

- Quantity of each chemical entering the waste stream, being recycled, treated, or disposed
- Source reduction best management practices used for each chemical
- Techniques used to identify source reduction opportunities.

Recycling

GRC has established goals for solid waste prevention and recycling for the year 2001. Recycling is the second choice in the hierarchy of preferable environmental waste management practices. The components of GRC's waste streams that can be recycled include, but are not limited to paper, cardboard boxes, aluminum cans, scrap metals, tires, used oil and batteries. GRC used these guidelines to set its recycling program:

- Training the GRC personnel to participate in the recycling program
- Obtaining appropriate approval and support for the recycling program
- Marketing recyclables and monitoring costs and revenues associated with the recycling program.

Treatment and Disposal

Treatment and disposal are the next two choices in the hierarchy of preferable environmental waste management. Treatment is for pollution that cannot be prevented or recycled in an environmentally safe manner. Disposal of hazardous waste is the last resort and used be done legally and in an environmentally safe manner at a permitted TSD facility.

Affirmative Procurement

GRC has established an affirmative procurement program for purchase of environmentally preferable materials as identified by the EPA in 40CFR 247, *Comprehensive Procurement Guideline for Products Containing Recovered Materials.* GRC uses NPG 8830, *NASA Procedures and guidelines for Affirmative procurement of Environmentally Preferable Goods and Services.*

PROCEDURES

Pollution prevention and greening the government are the responsibilities of all GRC employees. Knowledgeable and competent individuals have been assigned roles and responsibilities to guide and implement this plan, working with and encouraging participation from all GRC employees and organizations.

The roles and responsibilities of key individuals and teams are described below:

Environmental Pollution Control Board (EPCB)

- Formally approves and assigns members of the P2 Overview Committee, the PPOA Teams and the P2 Implementation Teams
- Conducts an annual management review of the P2 & GTG program and activities
- Establishes annual EMS targets

Chief, Environmental Management Office (EMO)

- Oversee the P2 and GTG activities, with particular regards towards consistency with the EMS and other NASA policies and requirements
- Appoints the Pollution Prevention Team Leader
- Appoints experts as necessary to a specific activity
- Help to obtain funding for selected projects when feasible

Pollution Prevention Team Leader (P2TL)

- Pursues new P2 and GTG opportunities continually
- Takes the lead on all P2 activities
- Responsible for all P2 reporting and documentation
- Chairs the Pollution Prevention Team meetings
- Develops and updates P2 metrics and Pollution Prevention Opportunity Assessment (PPOA) evaluation criteria
- Forms collaborations and seeks funding for selected P2 activities
- Promotes P2 site-wide
- Serves as a member of all PPOA projects and P2 Implementation Teams
- Analyzes all P2 activities for effectiveness
- Reports quarterly to the EMO Chief and the EPCB on progress towards meeting EMS objectives and targets
- Updates this plan annually

Pollution Prevention Team (P2T)

- Includes P2 Team Lead, appropriate representatives from Chemical Management Team, Environment Compliance Team, Logistics (recycling and purchasing), FTED, researchers, and representatives from specific key buildings
- Serves as an advisory group for the entire P2 program
- Reviews and recommends P2 metrics and PPOA evaluation criteria
- Collects P2 and GTG data as needed for records, reports and documents
- Selects activities for PPOA
- Requests experts as necessary on assignment to a PPOA
- Performs PPOA's (may be performed by a smaller project committee) and prepares the reports
- Reviews PPOA's (full committee)
- Recommends P2 Implementation Projects
- Recommends P2 Implementation Teams
- Reviews P2 Activities & results

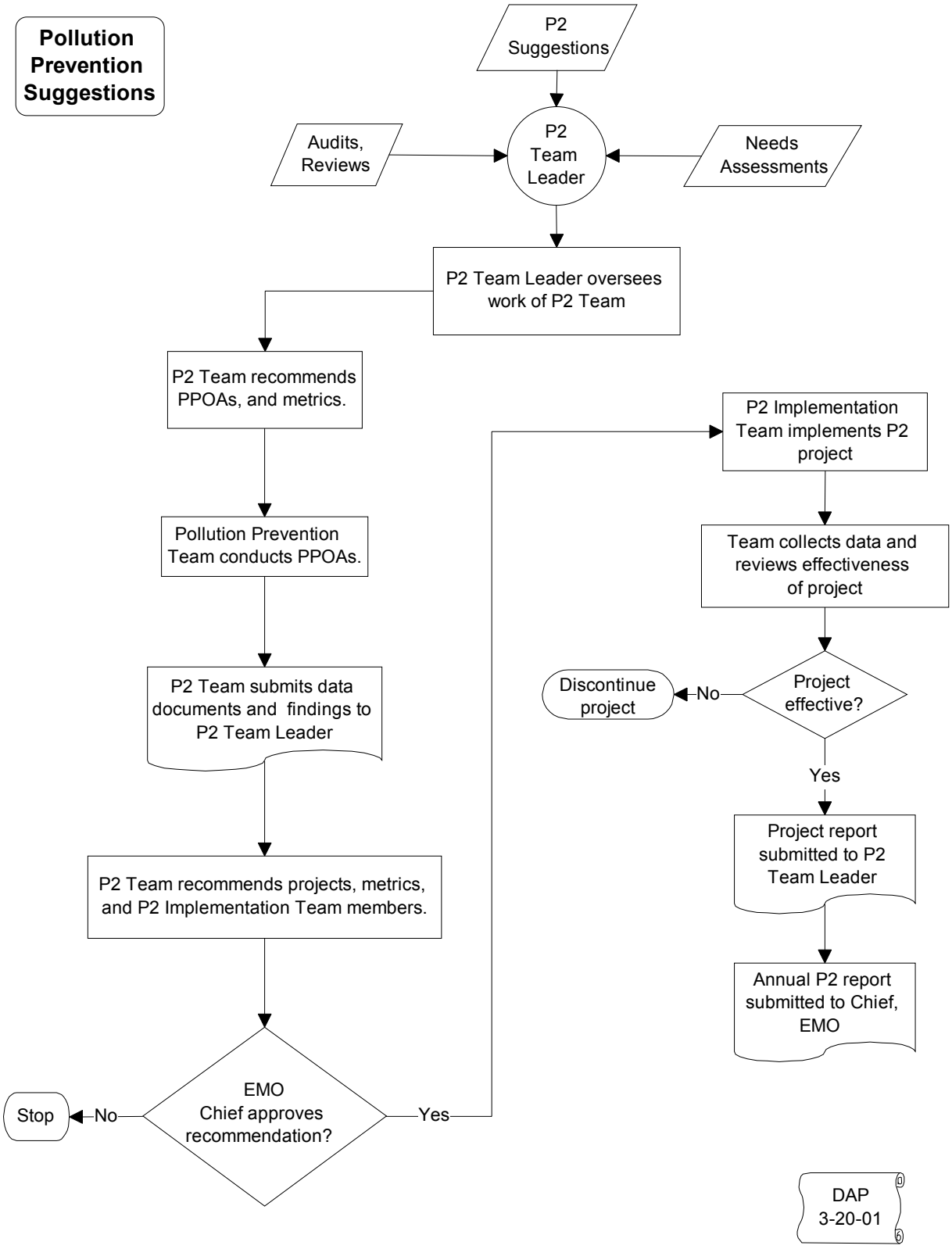
- Advises the P2 Team Lead on the preparation of P2 reports and documents
- Reviews and approves the annual P2 report to the EMO Chief & the EPCB

P2 Implementation Teams (P2IT)

- Consist of project-specific teams assembled from across GRC to implement a selected P2 activity, generally will include a substantial portion of the project PPOA Team, but will also include GRC personnel that will be most directly affected by the activity, includes the P2 Team Leader
- Use the funding provided through the P2 Team Leader to implement the activity
- Collect data/information to evaluate the project
- Information and comments/observations are provided to the P2 Team Leader for analysis

Facility Personnel

- All civil servants, contractors, academic visitors and other GRC personnel will cooperate with the PPOA and P2 Implementation Teams in their efforts to implement this plan
- On a volunteer basis, participate in the GRC Environmental Award Program


Pollution Prevention Suggestions
P2 Suggestions
Audits, Reviews
P2 Team Leader
Needs Assessments
P2 Team Leader oversees work of P2 Team
P2 Team recommends PPOAs, and metrics.
Pollution Prevention Team conducts PPOAs.
P2 Team submits data documents and findings to P2 Team Leader
P2 Team recommends projects, metrics, and P2 Implementation Team members.
EMO Chief approves recommendation?
No
Stop
Yes
P2 Implementation Team implements P2 project
Team collects data and reviews effectiveness of project
Project effective?
No
Discontinue project
Yes
Project report submitted to P2 Team Leader
Annual P2 report submitted to Chief, EMO
DAP 3-20-01

RECORDS

- Annual P2 Report to NASA Headquarters
- Quarterly Report of P2/GTG Activities
-
- Monthly P2 Projects Status Log
- PPOA's
- Implementation Projects Reports

REFERENCES

- 42 U.S.C. 13101 et seq., the Pollution Prevention Act of 1990
- Executive Order 12843, "Procurement Requirements and Policies for Federal Agencies for Ozone-Depleting Substances" (revoked by EO 13148)
- Executive Order 12844, "Federal Use of Alternative Fueled Vehicles"
- Executive Order 12845, "Requiring Agencies To Purchase Energy Efficient Computer Equipment"
- Executive Order 12856, "Federal Compliance With Right-to-Know Laws and Pollution Prevention Requirements" (revoked by EO 13148)
- Executive Order 12898, "Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations"
- Executive Order 12902, "Federal Efficiency and Water Conservation at Federal Facilities"
- Executive Order 12969, "Federal Acquisition and Community Right-to-Know" (revoked by EO 13148)
- Executive Order 13101, "Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition"
- Executive Order 13123, "Greening the Government Through Efficient Energy Management"
- Executive Order 13148, "Greening the Government Through Leadership in Environmental Management"
- Executive Order 13149, "Greening the Government Through Federal Fleet and Transportation Efficiency"
- Executive Order 13150, "Federal Workforce Transportation"
- NASA GRC, *GRC Environmental Programs Manual*
- NASA's Environmental Strategy, *Environmental Excellence for the Twenty-First Century*
- "NASA Plan for Implementation of Executive Order 12856, Pollution Prevention and Community Right-to-Know", October 1995
- US Environmental Protection Agency (EPA) *EPA Federal Facility Pollution Prevention Planning Guide*, EPA 300-B-94-012
- US Environmental Protection Agency (EPA) *Federal Facility Pollution Prevention: Tools for Compliance*, EPA 600-R-94-154

INFORMATION RESOURCES

- US EPA, *Costing and Life Cycle Analysis for Pollution Prevention Investments: A Practical Users Guide to Environmental Project Financial Analysis at Federal Facilities*
- US EPA, *Pollution Prevention Directory,* EPA 742-B-94-005
- Ohio EPA, Ohio Material Exchange (OMEx): a Statewide Recycling Service at **<http://www.epa.state.oh.us/opp/recyc/omex.html>**

- US EPA, Pollution Prevention Information Clearinghouse (PPIC) at <**http://www.epa.gov/opptintr/library/libppic/libppic.htm>**
- US EPA, Pollution Prevention Resource Exchange (P2Rx) at <**http://www.epa.gov/p2/p2rxdir.htm>**
- US EPA, Significant New Alternatives Policy (SNAP) Program at <**http://www.epa.gov/ozone/title6/snap/snap.html>**
- Massachusetts Toxic Use Reduction Institute, P2Gems at **<http://www.p2gems.org>**
- Ohio EPA, Office of Pollution Prevention at **<http://www.epa.ohio.gov/opp/p2lists.html>**
- National Pollution Prevention Roundtable at <**http://www.p2.org>**

APPENDIX 6-A - P2 PROGRAM CURRENT STATUS

The initial baseline for the evaluation of pollution prevention activities was established to be 1994, thus the status analysis relates to that baseline. However, the reference baseline may shift for certain goals as specified by law, regulation, EO and/or policy. EO 13148 establishes new goals that seem to imply the use of year 2000 data as the baseline. The appropriate baseline reference data will be used to analyze progress towards each goal and/or waste type target.

As a general overview of waste generation, the table below indicates variations that might be expected from a research facility. In particular, the hazardous waste generation was very dependent upon remediation activity as opposed to normal operations.

Table 1 - 1. OVERVIEW OF RELEASES FROM GRC
(Values in pounds unless otherwise noted)

Waste/emission Type	(baseline) 1994	1995	1996	1997	1998	1999	% reduction for 1999
Solid waste	2,574,000	NR	NR	NR	1,455,020	1,236,290	52%
Hazardous waste	1,001,564	1,994,954	706,565	48,701	1,707,141	2,765,140	-176%
Wastewater, sanitary (MCF)	22,422						
Air emissions, on-site			96,900	109,300	86,940	97,720	-1%
Air emissions, off-site (from electricity generation)	257,607	250,634	199,186	263,457	221,600	216,335	16%
Air emissions, off-site (from commuting) tons	7,555	0	0	0	0	6,090	19%

Figure 6-1 shows a decrease in the hazardous waste stream when the disposal of contaminated soil is subtracted from the total. The observed increase in total hazardous waste will be reduced drastically upon the completion of site remediation activities.

Figure 6-2 illustrates the TRI reported Ozone Depleting Chemicals (ODC) releases have been decreased drastically – meeting the goal of a 50% reduction well before the year 2000 target date.

Annual energy usage, as indicated by Figure 6-3, has not changed substantially since the reference year 1994. The research mission of the facility also limits the ability of GRC to substantially reduce the energy consumption, even though operational and institutional changes, such as using energy-conserving computers, have been implemented.

The air emissions released from stationary sources at GRC (Figure 6-4) have not changed substantially over the last four years, based upon Ohio EPA-approved calculated releases (AP 42) and the measured amounts of fuels used by equipment type. The oxides of sulfur emissions were up slightly, and the oxides of nitrogen were down slightly in 1999. These emissions were due somewhat to the research activities on-site, but boilers producing heat for the buildings generated a large portion of these emissions.

The electricity used onsite was generated by a power plant, which produced the estimated air emissions (Figure 6-5) as determined by a correlation factor provided by the utility company. The only opportunity that GRC has for reducing these emissions is to use less electricity.

The off-site air emissions (Figure 6-6) were estimated from the amount of vehicle-miles traveled by employees and contractors to and from GRC on workdays. There has been some reduction in NASA GRC-related vehicle miles in 1999. The opportunity for further reductions is in large part related to encouraging the use of mass transportation and car-pooling. The use of more efficient vehicles may also contribute to a reduction in emissions.

Figure 6-1

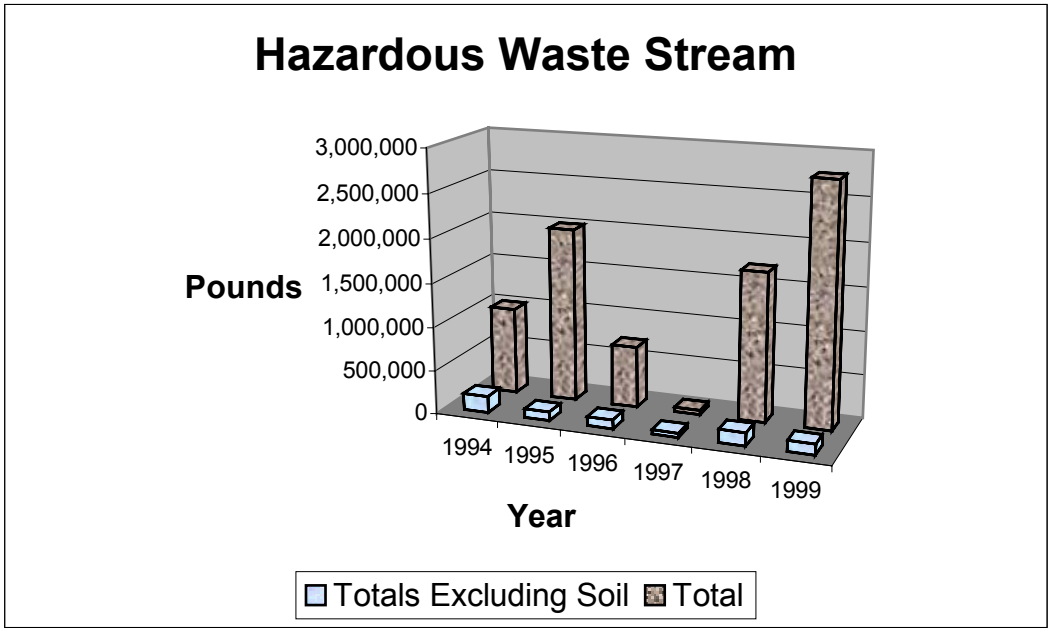


Figure 6-2

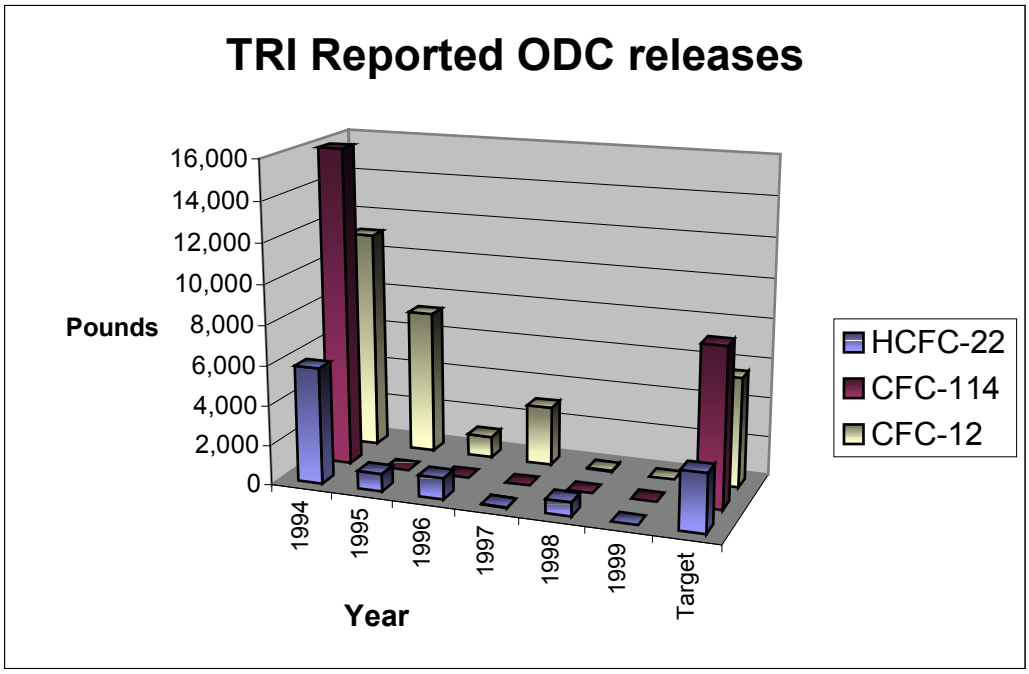


Figure 6-3

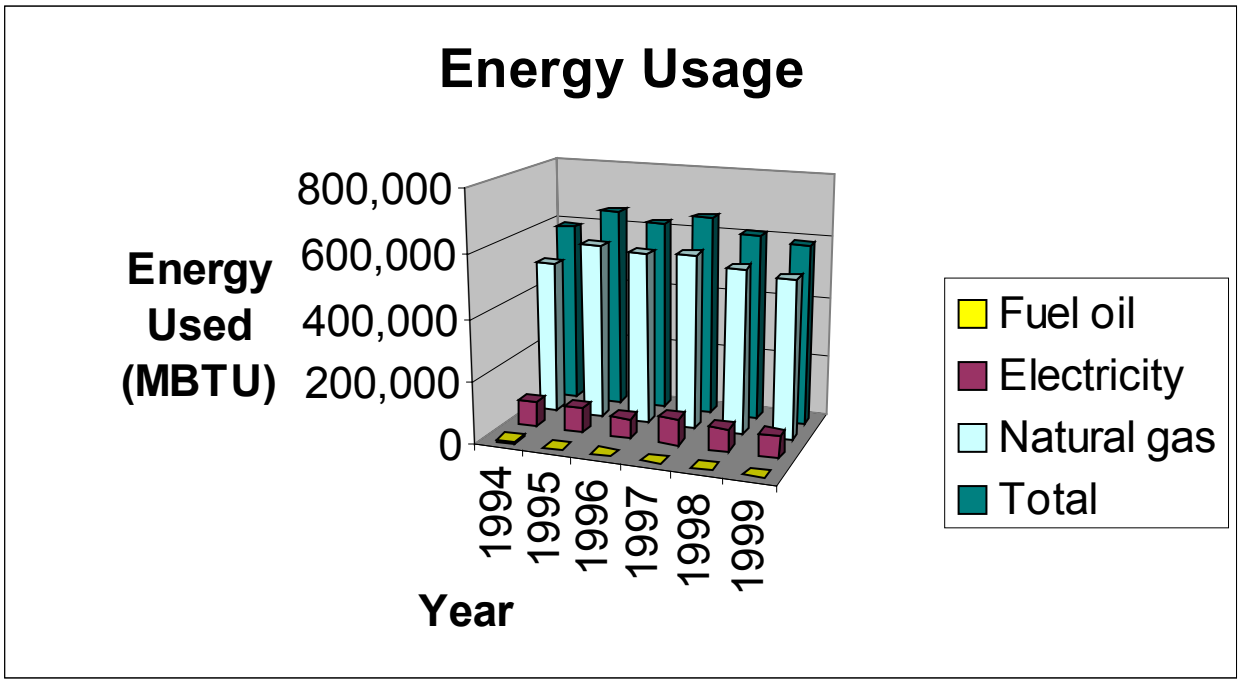


Figure 6-4

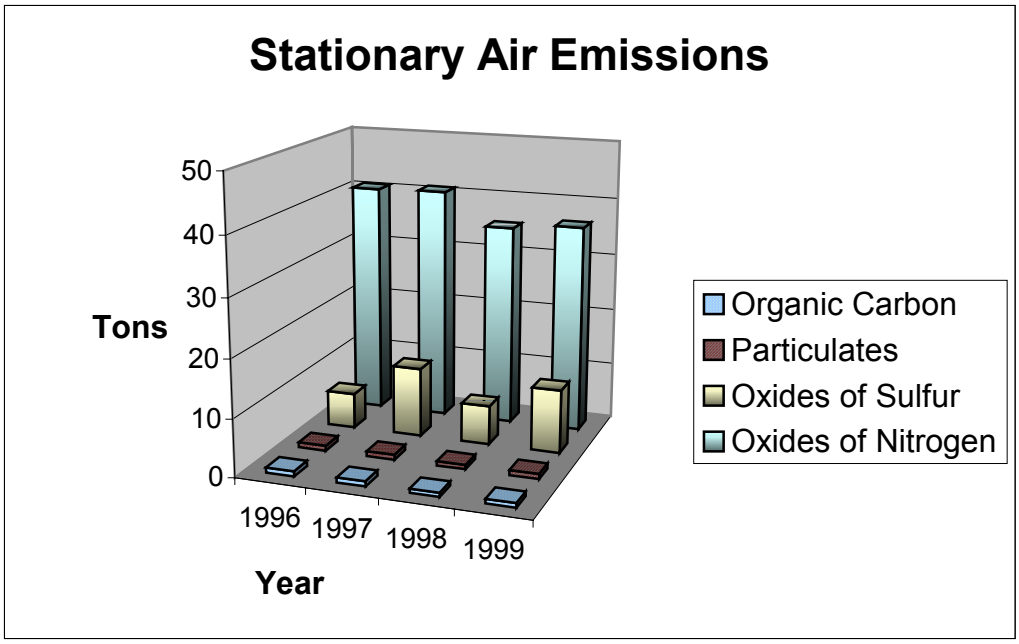


Figure 6-5

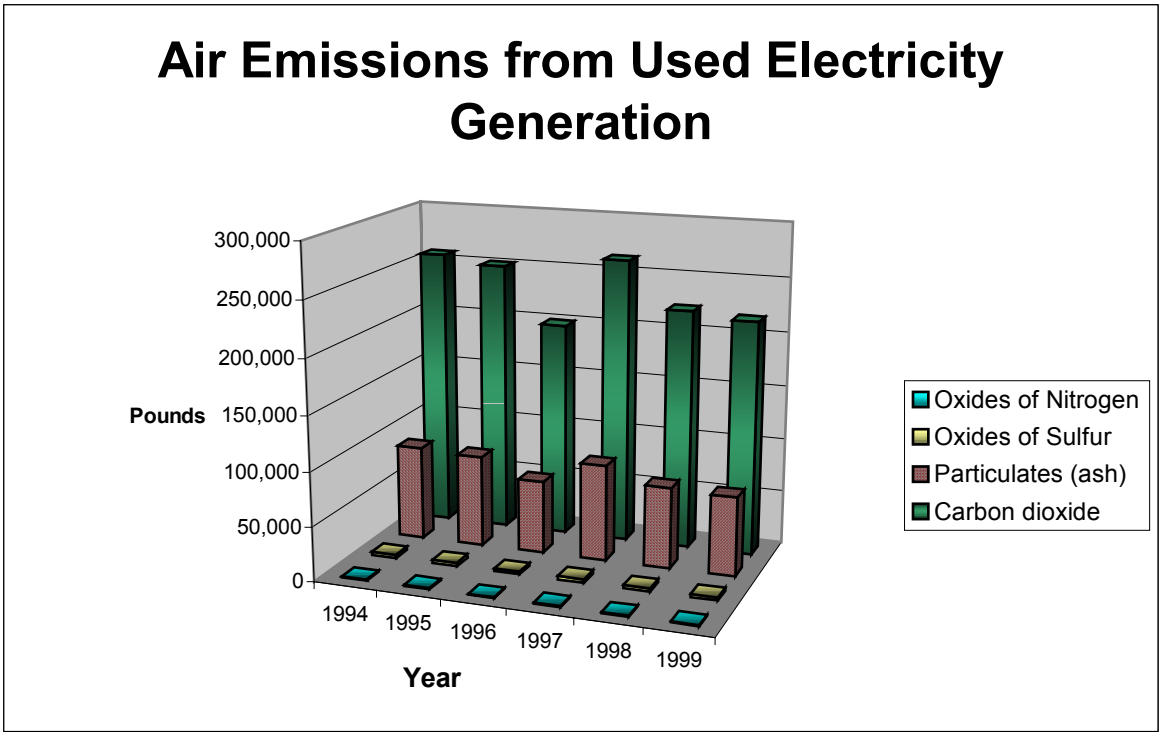
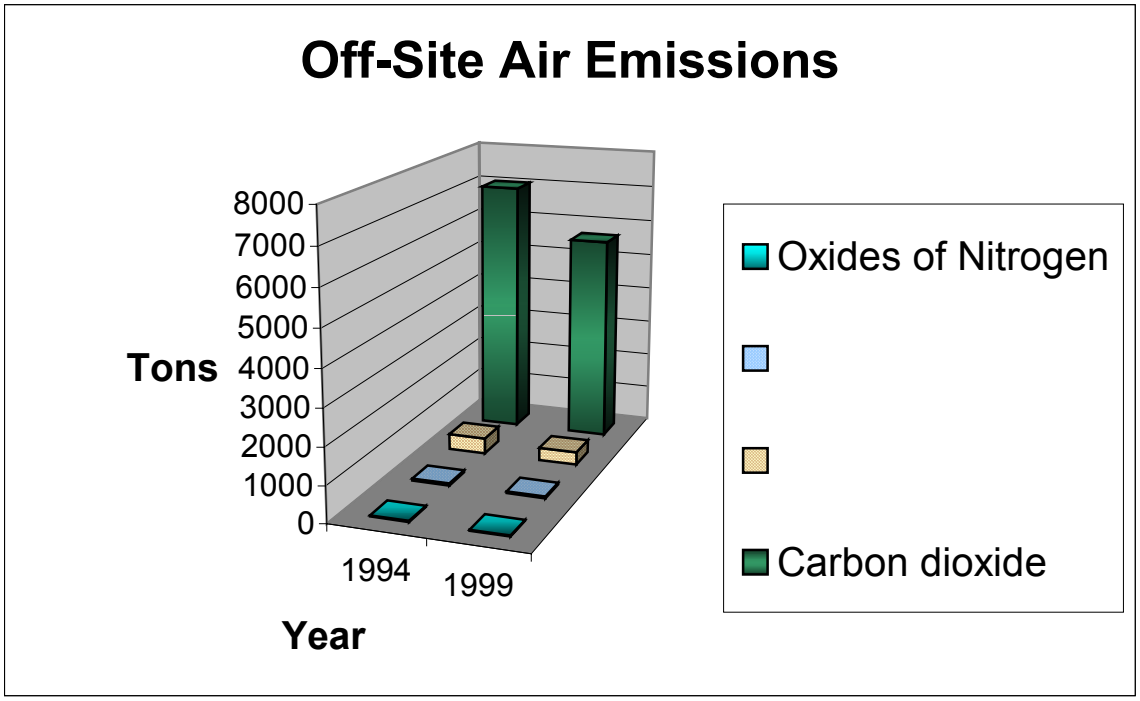


Figure 6-6



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